

CLAIMS

1. A data communication system comprising a transceiver unit for retromodulated optical communication with at least one of a plurality of retromodulator units, the transceiver unit comprising at least one of a plurality of transceivers, the transceivers transmitting diffused radiant energy at different angles covering a predetermined three-dimensional area, wherein each transceiver is enabled to set up and execute communication with at least one retromodulator unit located within its coverage area.
2. The system of claim 1 where the coverage areas are contiguous.
3. The system of claim 2 where the coverage areas overlap.
4. The system of claim 1 wherein each transceiver is further enabled to maintain continuous communication with a retromodulator unit that moves between coverage areas.
5. The system of claim 1 further comprising at least one of a plurality of retromodulator units, where the retromodulator unit comprises multiple arrays of lenslets connected to a common modulator and reflector.
6. The system of claim 1 where the retromodulator unit comprises a spherical arrangement of lenslets connected to a common modulator and reflector.
7. The system of claim 5 or claim 6 where the retromodulator unit is provided with an interface for communication with a data processing device.
8. The system of claim 1 further comprising at least one of a plurality of retromodulator units, where the retromodulator unit comprises two or

more parts, each part comprising a narrow band-pass optical filter and a modulator, each part communicating with a separate segment of the transceiver unit.

- 5 9. The system of claim 1, wherein the transceiver unit is configured to transmit low level radiation until detection of a retromodulator unit, whereupon the radiation level is increased in the transceiver covering the predetermined three-dimensional area in which the detected retromodulator unit is located.
- 10 10. The system of claim 9 where detection of the retromodulator unit is triggered by retroflected radiation from the retromodulator unit received by the transceiver unit.
11. The system of claim 9 where detection of the retromodulator unit is triggered by retromodulated radiation from the retromodulator unit received by the transceiver unit.
- 15 12. The system of claim 1 where the radiant energy is transmitted and received via an optical fiber.
13. The system of claim 1 where the radiant energy is modulated at a high frequency.
- 20 14. The system of claim 1 wherein the retromodulator unit is integrated into a remote control and communicates control data to the transceiver unit, which is integrated into a device controlled by the remote control.
15. The system of claim 14 where the remote control further comprises one or more photovoltaic cells.
- 25 16. The system of claim 15 where the remote control further comprises a battery charger.

17. The system of claim 1 wherein the retromodulator unit is integrated into an an electronic remote identification card and the transceiver unit is implemented in an access control point.
- 5 18. The system of claim 17 further comprising analyzing components for comparing biometric information permanently stored in the card with real-time biometric information obtained from the card owner.
19. The system of claim 18 where the real-time biometric information obtained from the card owner is sent to the transceiver unit via the retromodulator.
- 10 20. The system of claim 1 wherein the retromodulator unit is integrated into a micro aerial vehicle and the transceiver unit is a data collection station.
21. The system of claim 1 wherein the transceiver unit is integrated into a micro aerial vehicle and the retromodulator unit is a remote sensor.
- 15 22. The system of claim 12 where the transceiver unit is integrated into a data collection station and the retromodulator unit is a remote sensor.
23. The system of claim 22 where the remote sensors are installed internally along the length of a pipe.
- 20 23. The system of claim 12 where the transceiver unit is integrated into a data collection station and the retromodulator unit is a remote sensor that detects intruders.
24. The system of claim 1 where the transceiver unit is integrated into a photographic printing service and the retromodulator unit is integrated into a camera.
- 25 25. The system of claim 1 where the transceiver unit is integrated into a personal computer and the retromodulator unit is integrated into a camera.

26. The system of claim 1 where the transceiver unit is integrated into a media system and the retromodulator unit is integrated into remote identification tag.

5 27. A method for retromodulated data communication, the method comprising:

providing a transceiver unit comprising at least one of a plurality of transceivers;

10 transmitting diffused radiant energy through the transceivers at different angles covering a predetermined three-dimensional area;

setting up communication between a transceiver and a retromodulator unit located within the coverage area of that transceiver;

15 executing the communication between the transceiver and the retromodulator unit.

28. The method of claim 27 where setting up communication comprises:

a retromodulator in a transceiver's area of coverage retroreflecting the radiant energy;

20 the transceiver responding to the retroflection by increasing the power of the radiant energy;

the retromodulator responding to the higher power by initiating data modulation of the radiant energy.

29. The method of claim 27 where setting up communication comprises:

25 a retromodulator in a transceiver's area of coverage retromodulating the radiant energy with an initial handshake signal;

the transceiver responding to the retromodulation by increasing the power of the radiant energy;

the retromodulator responding to the higher power by initiating data modulation of the radiant energy.